

Water Security in Africa - Initial Phase Stakeholder Information Event

Monday, 10/10/2022

PROCEEDINGS

RESEARCH AND
EDUCATION PROGRAM

SPONSORED BY THE



Federal Ministry
of Education
and Research

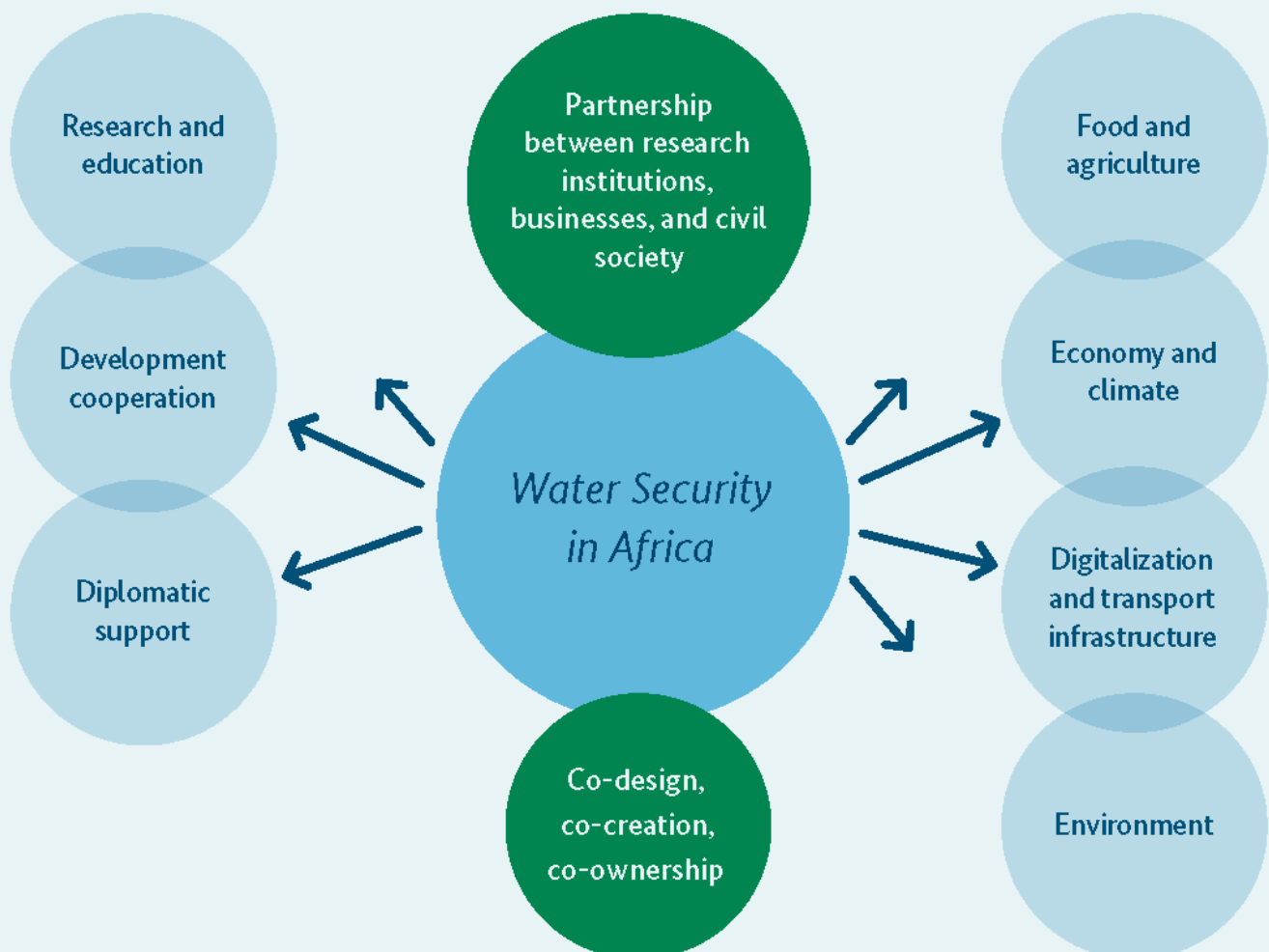
*Water Security
in Africa (WASA)*

Water Security in Africa - Stakeholder Information Event

Safe access to sustainable water resources is an essential element for improving living conditions in Africa and for the SDG6 in general. Significant investments in the water sector can be expected. Innovative water technologies, adapted water infrastructure and forward-looking management concepts are urgently needed. As a result of the German Federal Government's round table on "Creating Perspectives in Africa" and a co-design process with African partners, the long-term interministerial program "Water Security in Africa (WASA)" was launched with a focus on research and education. 13 collaborative projects are currently conducting research in the initial phase of the program. Ahead of the WASA main program phase, it is timely to inform stakeholders at program level and review current progress.

For more information and details please visit:

<https://www.fona.de/en/measures/funding-measures/water-security-in-africa-wasa.php>



ABSTRACTS

River basins and Hydrological Predictions

- SusTraL** - Sustainable resource management to ensure water security in the Limpopo River Basin: an initiative for a transboundary hydro-economic model **3**
- OWASA** - Open science to support local water security in Southern Africa **4**
- COHYDIM-SA** - Co-design of a hydro-meteorological information system for sustainable water resources management in southern Africa **5**

Urban and Community based approaches

- NEU-Water** - Nature Engineered Urban design for Water recycling & reuse **6**
- KreATiw** - Climate resilience, sanitation and water safety **7**
- CoSMOS** - Development of a Community-based Sustainable Water Management and Observation System **8**
- FIUWA** - Frugal Innovation and Entrepreneurship in Water 4.0 in Africa **9**

Water infrastructure and water reuse

- WaReNam** - Multi-Scale Water Reuse Strategy for Namibia **10**
- MultiReWaS** - Multifunctional strategies for resilient water security in the Eastern Erongo region **11**
- ECWASA** - Innovative water infrastructure management to increase water security for civilians, Economy and Agriculture in Southern Africa **12**

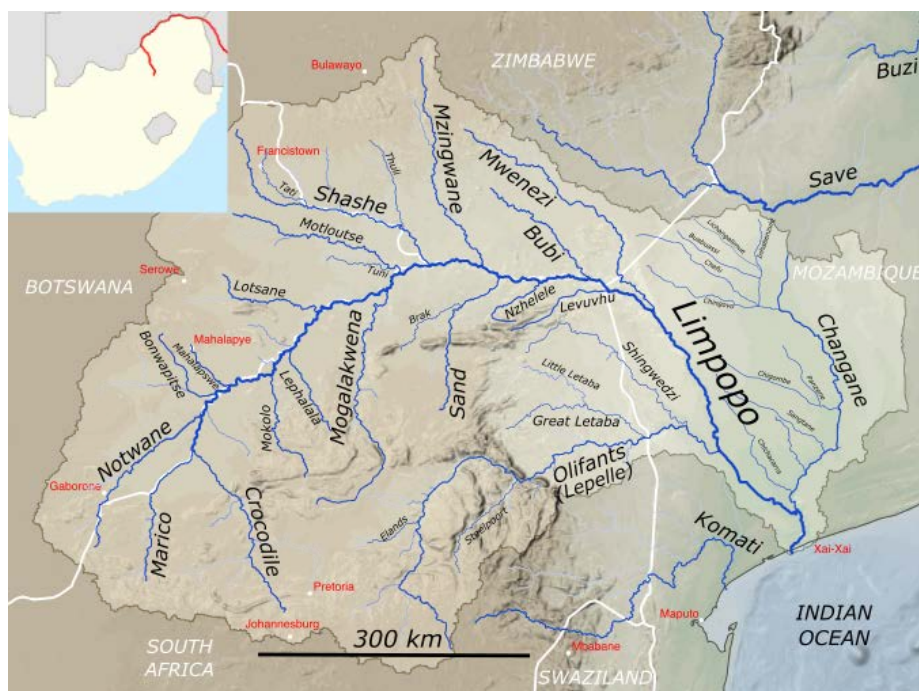
Water and Mining

- WaMiNa** - Sustainable and climate adapted Water Management in Mining Industry of Namibia and neighbouring countries **13**
- MiWaSec** - Mining and water security: Development and implementation of innovative strategies for the prevention and remediation of mining-related damage to critical water resources in southern Africa **14**
- MAMDIWAS** - Membrane-based decentralized reclamation of acid mine drainage for improvement of water security and mitigation of environmental impacts in Southern Africa **15**

SusTraL – Sustainable Resource Management to Ensure Water Security in the Limpopo River Basin: An Initiative for a Trans-boundary Hydro-Economic Model

PROJECT SUMMARY

SusTraL is an inter- and transdisciplinary project focusing on the Limpopo-River-Basin (LRB). The LRB has a catchment area of nearly 408,000 km² and its water resources, shared by South Africa, Botswana, Mozambique, and Zimbabwe, are under severe pressure, due to constant increases in water demand, among other things. In addition to water availability, water pollution is a major issue in the LRB with direct impacts on the livelihoods of local people and indirect impacts on the functionality of local ecosystems. Against this background, SusTraL has the objective to develop a hydro-economic model to inform decision-makers about courses of action for the sustainable use of water resources.



Copyright: Keenan Pepper (CC BY-SA 4.0)

KEYWORDS: Hydro-Economic Model, Limpopo-River-Basin, Transboundary Water Issues, Availability, Water Quality

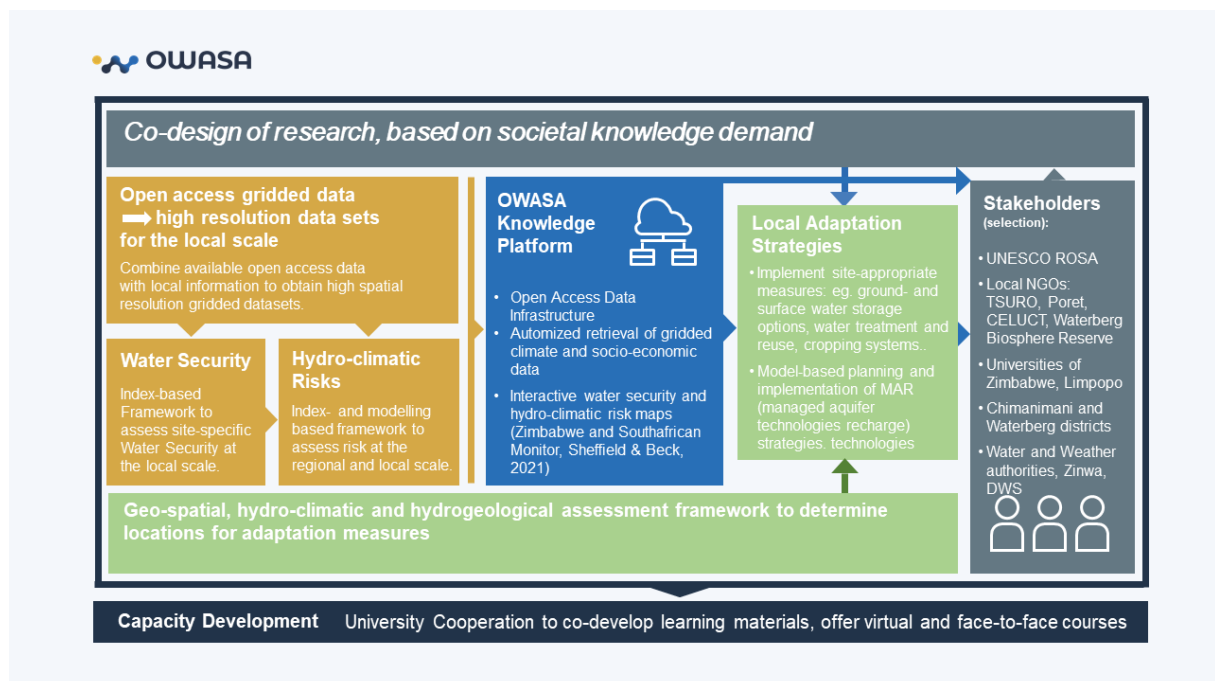
CORE PROJECT PARTNERS: Kiel University (CAU), Germany; Kiel Institute for the World Economy (IfW), Germany; University of Botswana (ORI), Botswana; Eduardo Mondlane University (UEM), Mozambique; University of Cape Town (UCT), South Africa

CONTACTS FOR FURTHER INFORMATION: Prof. Dr. Katrin Rehdanz, Kiel University, Department of Economics, rehdanz@economics.uni-kiel.de

OWASA – Open Science to Support Local Water Security in Southern Africa

PROJECT SUMMARY

Hydro-meteorological extremes and water quality deterioration are increasingly challenging Water Security in Southern Africa. As water-related problems vary locally, adaptation strategies need to be designed at the local level. The OWASA project aims to support local decision making towards water security. Based on open access raster data, observations and monitoring, we develop transferable approaches for local water security assessment and adaptation design, considering in particular nature based solutions. Data and approaches are made available to academia and government through an online platform and a capacity development concept. We test them in contrasting pilot regions in Zimbabwe (Chimanimani) and Southafrica (Waterberg), in close collaboration with local stakeholders and universities.



KEYWORDS: Water Security, Hydro-Climatic Extremes, Open Access Raster Data, Adaptation, Managed Aquifer Recharge

CORE PROJECT PARTNERS:

Institute for Technology and Resources Management in the Tropics and Subtropics (ITT), TH Köln-University of Applied Sciences; Institute of Applied Geosciences, Technical University Darmstadt; UNESCO Regional Office for Southern Africa ROSA; Local NGOs: TSURO, Poret, CELUCT, Waterberg Biosphere Reserve; University of Zimbabwe, Limpopo University; Water and Weather authorities, eg. Zinwa and DWS; Chimanimani and Waterberg districts

Further partners: University of Southampton, School of Geography and Environmental Sciences; ICWRGC will provide connection to the Global Terrestrial Network Hydrology GTNH and Southern Africa FRIEND-Water network.

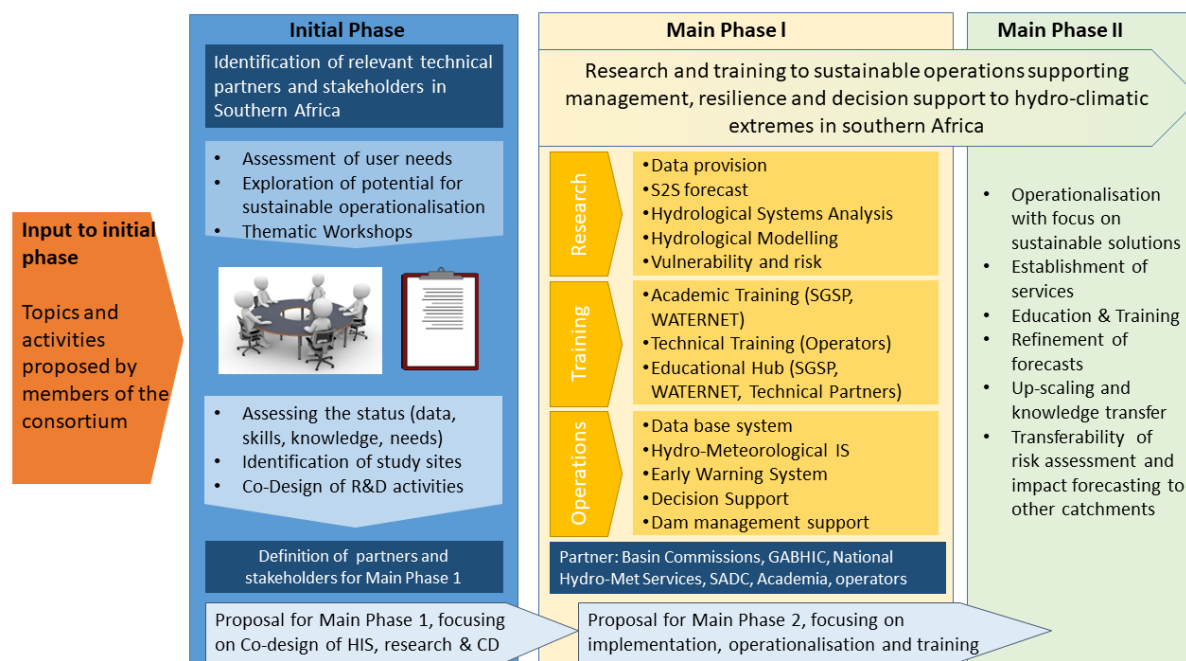
CONTACTS FOR FURTHER INFORMATION:

Alexandra.nauditt@th-koeln.de, lars.ribbe@th-koeln.de, justyna.Sycz@th-koeln.de

CO-HYDIM-SA – Co-design of a Hydro-Meteorological Information System for Sustainable Water Resources Management in Southern Africa

PROJECT SUMMARY

The overall goal of CO-HYDIM-SA is to co-design and co-produce a hydro-meteorological information system with partners in southern Africa, which will not only enable seamless weather and climate services to augment water security but also enhance the resilience to multiple weather, climate, and water related hazards through people-centred information platforms including tailored Early Warning Systems. The user-oriented and science-based information systems will be jointly implemented with the respective basin commissions and national water authorities in two transboundary catchments, namely the Cuvelai-Etoshia-Basin and the Limpopo Basin. The Co-HYDIM-SA activities will be supported by an educational hub in meteorology and hydrology that considers capacity development needs of both academic and operational institutions and linked closely with SASSCAL SGSP.



KEYWORDS: Co-development, Early Warning, Seamless Hydro-Climatic Services, Transboundary Catchments, Educational Hub

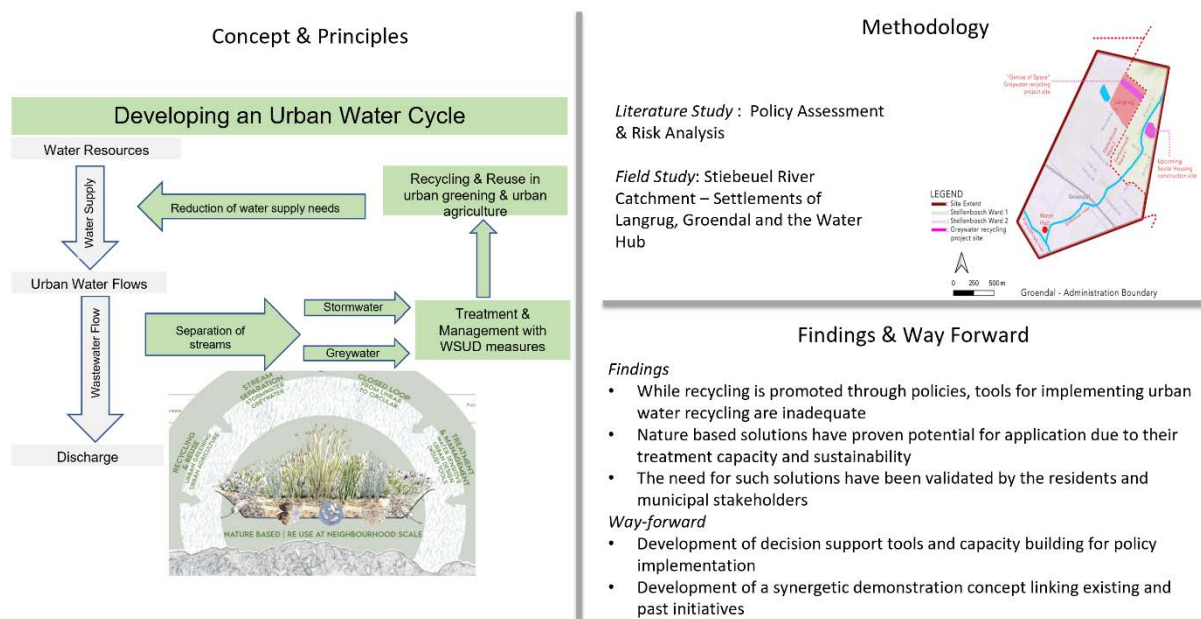
CORE PROJECT PARTNERS: KIT, DWD, ICWRGC, University of Bonn, University of Frankfurt, University of Stellenbosch, BIUST, SASSCAL, IWMI, CUVECOM, MALWR, LIMCOM, UNZA, UB, SADC Water, NMS (Namibia), GIZ (Namibia, Botswana)

CONTACTS FOR FURTHER INFORMATION: Prof. Dr. Andreas Fink (Tel.: +49 721 608-48711, andreas.fink@kit.edu)

NEU-Water – Nature Engineered Urban Design for Water Recycling & Reuse

PROJECT SUMMARY

NEU-Water aims to develop approaches and processes to promote recycling of stormwater and greywater while developing Water Sensitive Cities. The key research focus is on identifying scalable steps for stormwater and greywater recycling which can be adopted as water sensitive urban design measures particularly for the development of housing for informal as low – middle income settlements. In the initial phase, the project is assessing policy gaps and regulatory challenges as well as environmental and public health risks of urban water recycling. Through stakeholder engagement, it is aimed to develop a viable demonstration concept in the selected study area of Groendal & Langrug.



KEYWORDS: Water Sensitive Urban Design, Greywater, Stormwater, Water Recycling, Informal Settlements

CORE PROJECT PARTNERS: HafenCity University Hamburg, Germany; University of Cape Town, South Africa; Ardhi University, Tanzania; Urban Waters Consulting, Germany

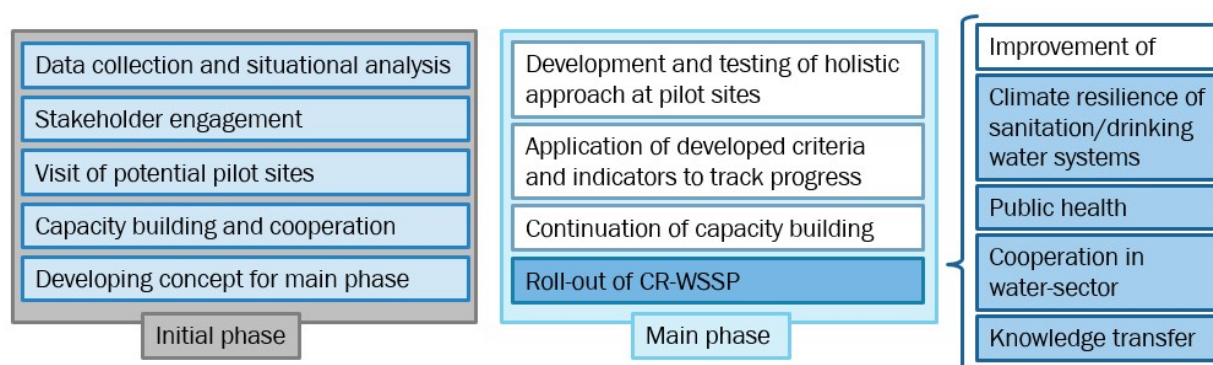
CONTACTS FOR FURTHER INFORMATION:

Research Group of Environmentally Sound Urban and Infrastructure Planning (USIP), HafenCity University Hamburg
Prof. Wolfgang Dickhaut - wolfgang.dickhaut@hcu-hamburg.de
Ajith Edathoot - ajith.edathoot@hcu-hamburg.de

KreATiw – Klimaresilienz, Abwassersicherheit und Trinkwassersicherheit (Climate Resilience, Sanitation and Water Safety)

PROJECT SUMMARY

The objectives of the KreATiw project are to use lessons from South Africa to refine and test a methodology to successfully integrate climate variability and change into existing water supply and sanitation risk management approaches for a holistic integrated water risk management approach, and grow and develop capacity that enables the roll-out of the approach throughout southern Africa. Our goal is to support water and wastewater authorities and facilities to increase their systems' climate resilience and thereby contribute to the improvement of sustainable access to safe drinking-water and sanitation.



KEYWORDS: Climate Resilient Water and Sanitation Safety Planning (CR-WSSP)

CORE PROJECT PARTNERS: German Environment Agency (UBA), German Water Centre (TZW), Emanti Management

CONTACTS FOR FURTHER INFORMATION:

laura.huber@uba.de +49 (0)30 8903-4852

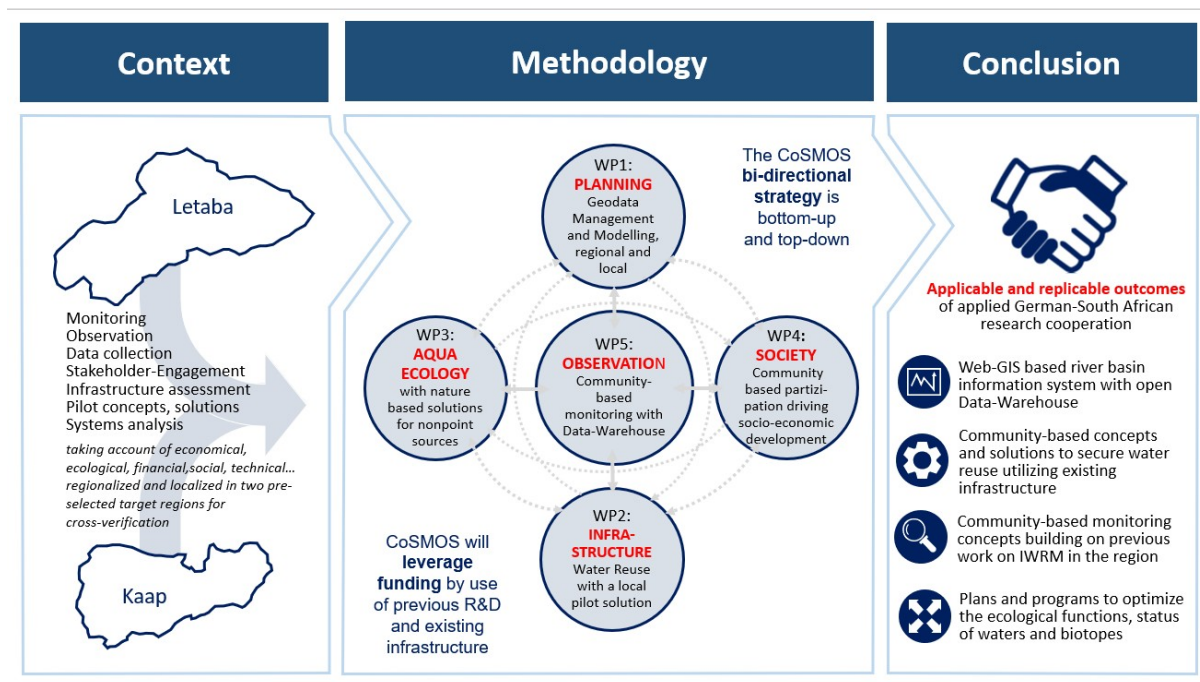
sebastian.sturm@tzw.de +49 (0)721 9678-200

matthewd@emanti.co.za +27 (021) 880 2932

CoSMOS - Community-based Sustainable Water Management and Observation System

PROJECT SUMMARY

The R&D project shall combine Intelligent Geodata Management and Modelling to generate appropriate information on water resources with a pilot-solution designed for a sustainable Water Reuse and Wastewater Utilization. It will tackle water-related quality and supply deficits on community AND river basin level. The concept will strengthen Public Participation and local Socio-Economic Development with concrete concept solutions to improve the ecosystem status by Ecological Optimisation of water bodies and biotope networks with focus on Nature Based Solutions. The overarching information for and from the Observation will be accessible from the community to the national level through a Data Warehouse. CoSMOS can build on its' previous R&D outcomes and implementation in the target region and has located a pilot community with ideal conditions to leverage R&D funding and replicate the pilot solution throughout the WASA area.



KEYWORDS: South Africa, River Basin, Water Management, Community, Monitoring

Core project partners: Institute of Environmental Engineering and Management at the Witten/Herdecke University (IEEM), OWL University of Applied Sciences and Arts (TH-OWL), Ruhr-University Bochum (eE+E), Disy Informationssysteme, DIE GEWÄSSER-EXPERTEN!, chromgruen, IBC Ingenieurtechnische Beratung Christoffels, South African National Parks, University of Pretoria, University of Mpumalanga, Letaba Water Users Association, Kaap River Valley Major Irrigation Board, Inkomati-Usuthu Catchment Management Agency, Water Research Commission (assoc.), GIZ South Africa (assoc.), Department of Water Affairs and Sanitation DWS (assoc.)

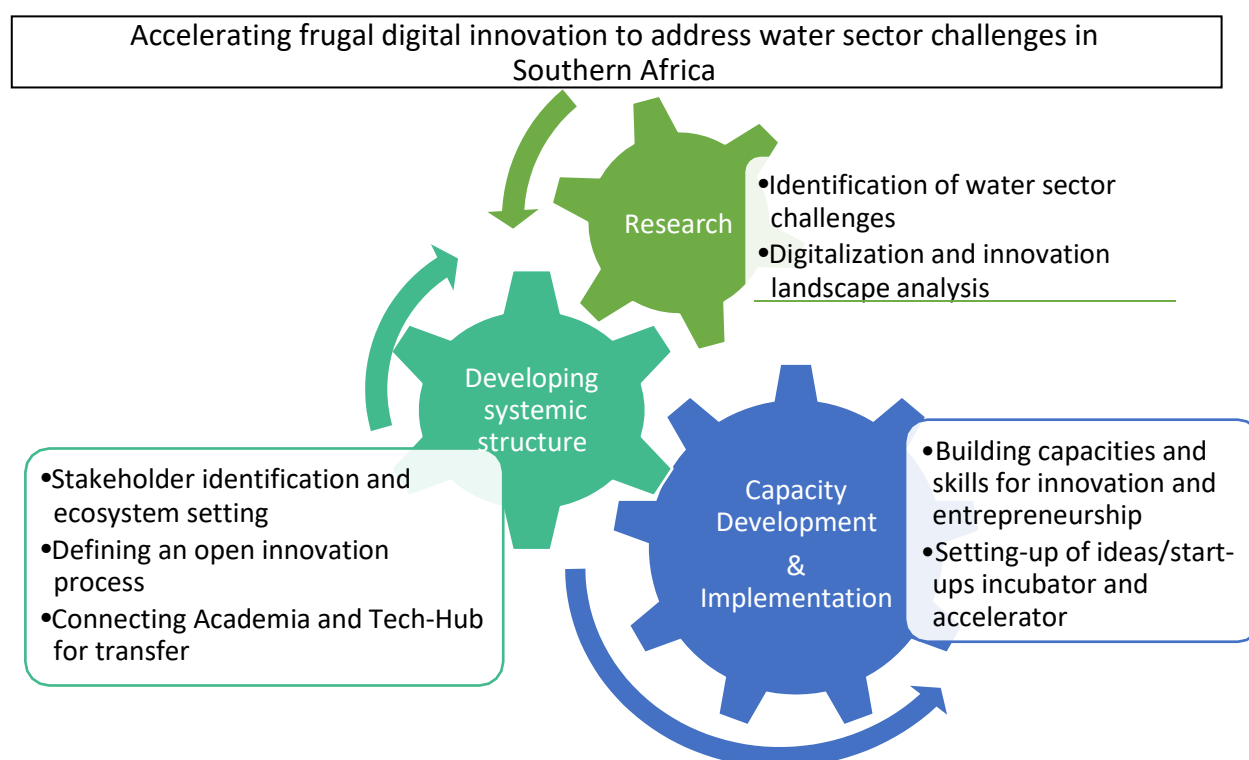
CONTACTS FOR FURTHER INFORMATION

Prof. Dr.-Ing. Dr. rer. pol. Dr. h.c. Karl-Ulrich Rudolph, IEEM gGmbH, mail@uni-wh-ieem.de
Prof. Dr.-Ing. Christian Jolk, TH-OWL, christian.jolk@th-owl.de

FIUWA – Frugal Innovation and Entrepreneurship in Water 4.0 in Africa

PROJECT SUMMARY

Many countries in Southern Africa lack sufficient infrastructure for sustainable distribution, utilization and management of water resources. In line with recent success of frugal innovations and youth entrepreneurship in the mobile sector in Africa, the FIUWA project focuses on knowledge co-creation and ecosystem setting to support youth in the development of low costs, economically viable, socially acceptable and locally adaptable innovative solutions/start-up building on digital technologies in response to core challenges in the fields of “Water and Agriculture”, “Climate information and Water” and “Water Resources Management” in Namibia, Angola and South Africa as case study countries.



KEYWORDS: Water Security, Frugal Innovation, Digital Technologies, Youth Entrepreneurship, Southern Africa

CORE PROJECT PARTNERS: United Nations University Institute for Environment and Human Security (UNU-EHS), Fraunhofer Center for International Management and Knowledge Economy IMW, German Water Partnership (GWP), AfriLabs, African Water Association (AfWA), Stellenbosch University as Secretariat of AUDA-NEPAD Southern African Network of Water Centres of Excellence (AUDA-NEPAD SANWATCE)

CONTACTS FOR FURTHER INFORMATION:

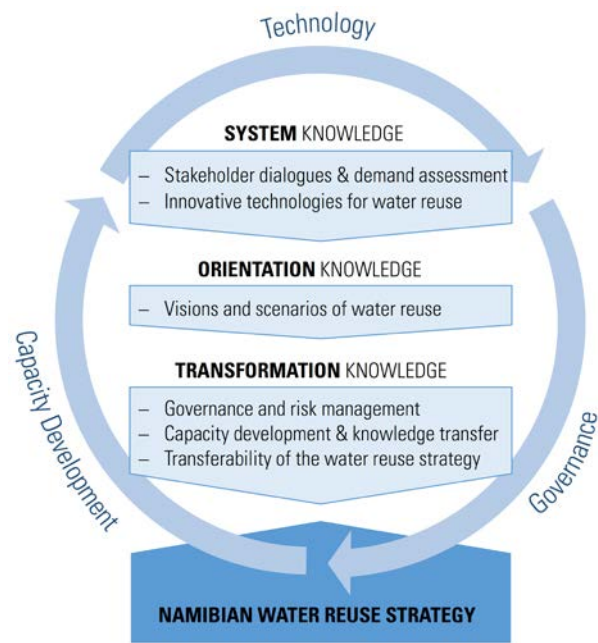
Dr. Erick Tambo – tambo@ehs.unu.edu

Dr. Christine Richter – christine.richter@imw.fraunhofer.de

WaReNam – Multi-Scale Water Reuse Strategy for Namibia – Technology, Governance and Capacity Development

PROJECT SUMMARY

WaReNam aims at developing a water reuse strategy for Namibia to increase water security and enable mutual learning between science and practice. The project explores the potentials of reusing municipal wastewater for agricultural and industrial purposes. An integrated water reuse concept aligns existing water infrastructures and different water quality requirements. Research activities involve adapting national water reuse regulations. Capacity development measures ensure the sustainable management of water reuse facilities. WaReNam promotes a co-design process with Namibian and German stakeholders. The water reuse strategy also serves as a role model for other African countries.



KEYWORDS: Institutional Structures, Oshakati, Social-Ecological Transformation, Transdisciplinarity, Walvis Bay

CORE PROJECT PARTNERS: German partners: ISOE – Institute for Social-Ecological Research; Technische Universität Darmstadt; Emschergenossenschaft; industry partners; Namibian partners: Ministry of Agriculture, Water and Land Reform; Local and regional authorities (Walvis Bay, Oshakati, Outapi etc.); Cuvelai Watercourse Commission; Southern African Science Service Centre for Climate Change and Adaptive Land Management; Windhoek Goreangab Operating Company; NamWater; University of Namibia; Namibian University of Science and Technology; International University of Management; Namibian Institute of Mining and Technology; Deutsche Gesellschaft für Internationale Zusammenarbeit

CONTACTS FOR FURTHER INFORMATION:

Dr.-Ing. Martin Zimmermann
Head of Research Unit Water Infrastructure and Risk Analyses
ISOE – Institute for Social-Ecological Research
Hamburger Allee 45, 60486 Frankfurt am Main, Germany
Tel. +49 (0) 69 707 6919-44
zimmermann@isoe.de

MultiReWaS – Multifunctional Strategies for a Resilient Water Security in the Eastern Erongo Region (Karibib, Omaruru, Otjimbingwe)

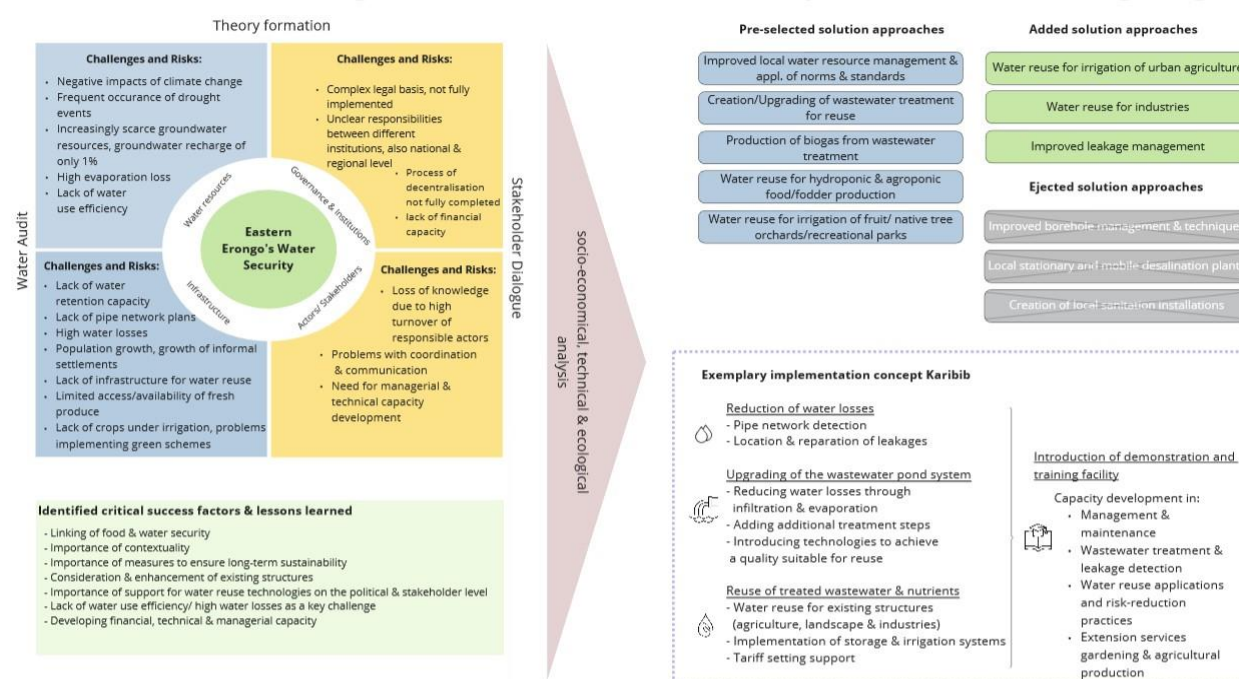
PROJECT SUMMARY

Impacts of climate change, population growth, and intensification of water-intensive industries increasingly threaten the water security in Namibia's Eastern Erongo region. Innovative strategies that consider the socio-economic, -technical, and -ecological realities of the region are needed to secure and improve the sustainable and safe supply, access, and use of water resources.

With the analytical lens of the social-ecological systems approach and the expertise of multiple actors of the region, the *MultiReWaS* project consortium is assessing such strategies and developing a sustainable implementation approach to improve water security in the region and beyond.

Figure 1: Graphical abstract MultiReWaS project

Multifunctional strategies for resilient water security in the Eastern Erongo region



KEYWORDS:

Socio-Ecological Systems, Water Security, Water Efficiency, Water Reuse, Water/Energy/Food Nexus

CORE PROJECT PARTNERS: TERRA URBANA Umlandentwicklungsgesellschaft mbH (TUR), Forschungsinstitut für Wasserwirtschaft und Klimazukunft e.V. (FiW), Namibia University of Science and Technology (NUST)

CONTACTS FOR FURTHER INFORMATION:

Dr. Jens Dautz (Project coordination) jdautz@terraurbana.de

PRESENTATION WASA STAKEHOLDER EVENT:

Dr. Henry Risse (FiW) and Alea von Grote (TUR)

ECWASA – Innovative Water Infrastructure Management to Increase Water Security for People, Economy and Agriculture in Southern Africa

PROJECT SUMMARY

Water scarcity, rapid population growth, frequent droughts, energy shortages as well as a decline in water infrastructure resulting from systemic water infrastructure governance failure pose the major challenges in the water sector in the Eastern Cape province of South Africa. The ECWASA project focusses on the joint development and integration of innovative scalable socio-technological solutions for a resource efficient improvement of the water and wastewater infrastructure to ensure equitable, safe and reliable access to water and sanitation for municipalities, agricultural sector and industries under changing environmental conditions.



KEYWORDS: Decision Support Tool, Water Infrastructure Governance, Socio-Technological Innovations, Water Efficiency, Water Reuse.

CORE PROJECT PARTNERS: Buffalo City Metropolitan Municipality, Kouga Local Municipality, Mercedes Benz SA, Ilsfeld Municipality, Oldenburgisch-Ostfriesischer Wasserverband, Research Institute for Water Management and Climate Future at RWTH Aachen University (FiW), Institute for Water Research at Rhodes University, please refer to further South-African and German partners in graphical abstract

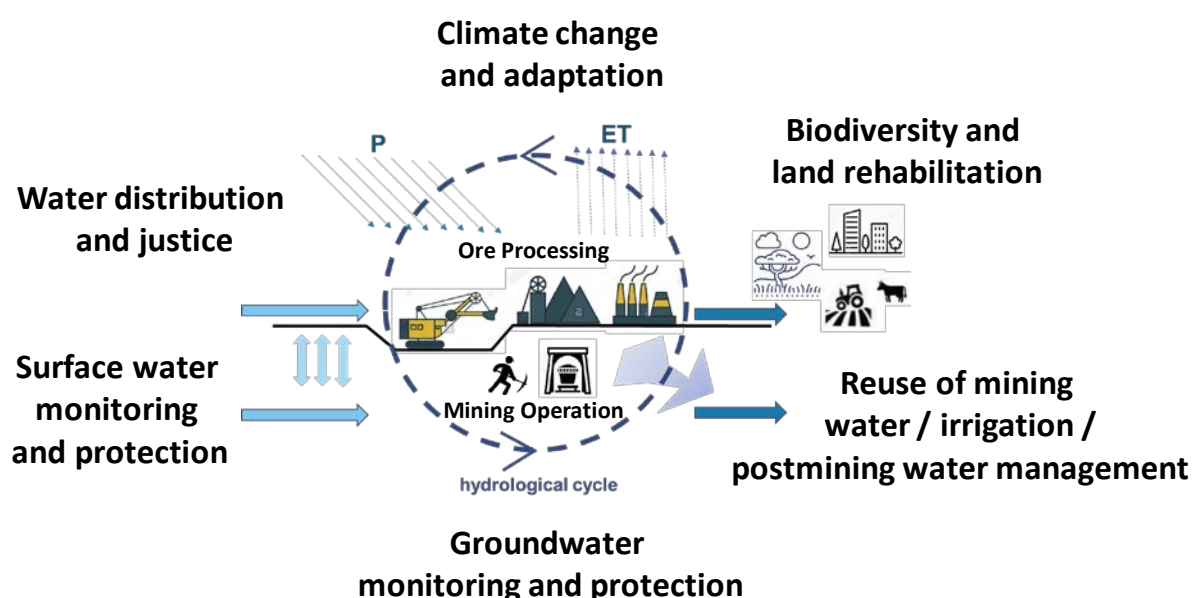
CONTACTS FOR FURTHER INFORMATION:

Dipl.-Ing. Manuel Krauß; Research Institute for Water Management and Climate Future at RWTH Aachen University, Germany; +49 241 80 2 68 43 | krauss@fiw.rwth-aachen.de
Prof. Nelson Odume; Institute for Water Research
Rhodes University, South Africa; +27 46 603 7693 | n.odume@ru.ac.za

WaMiNa – Sustainable and Climate Adapted Water Management in Mining Industry of Namibia and Neighboring Countries

PROJECT SUMMARY

Mining activities require large quantities of water for the extraction and processing of ores, for energy production or dust control, and for the management of post-mining landscapes. The quality of mine waters depends on the particular production process, the geogenic background and the chemicals used in mining and processing. Often, the resulting mine waters can severely contaminate groundwater and surface water and thus the surrounding environment. This project aims to develop management strategies for a sustainable handling of mine waters with respect to reuse, such as irrigation of phytoremediation measures, and the protection of surrounding groundwater and surface water resources.



KEYWORDS: Mine Water Quality and Reuse

CORE PROJECT PARTNERS: University of Potsdam, Germany; Karlsruhe Institute of Technology, Germany; Water Technology Center Karlsruhe, Germany; Sensatec GmbH, Germany; Aquantec GmbH, Germany; Hydroisotop GmbH, Germany; Desert Research Foundation of Namibia; Namibia University of Science and Technology; Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL); Rosh Pinah Zinc Corporation Ltd., Namibia; Namibia Water Corporation Ltd.; Delta h, Water Systems Modelling; Water Research Commission; Botswana International University of Science and Technology; University of Zambia

CONTACTS FOR FURTHER INFORMATION:

Prof. Dr. Stefan Norra, norra@uni-potsdam.de, Karl-Liebknecht-Str. 24-25, 14476 Potsdam

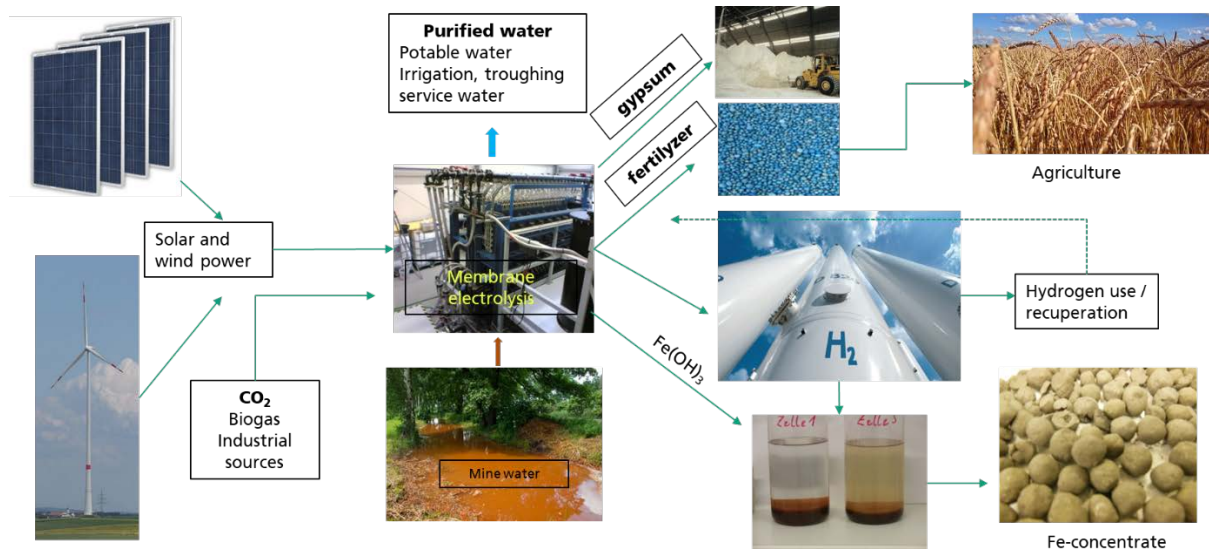
MiWaSecure – Mining and Water Security: Development and Implementation of Innovative Strategies for the Prevention and Remediation of Mining-Related Damage to Critical Water Resources in Southern Africa

PROJECT SUMMARY

Contamination of water bodies by mining is one of the greatest challenges in the region, especially in the province of Gauteng and parts of the Vaal and Gariep catchment areas and affects the security of water supply. In our approach we focus on:

- examine whether and how water resources can be protected by a combination of management strategies and technical protective measures
- investigate and adapt technologies for re-use of mining wastewater i.e. as service- or even as potable water.

For this purpose, a portfolio of technological approaches ranging from water body protection and catchment management to modern circular water treatment will be investigated and scaled up in place.



Circular water treatment schema based on electrochemical membrane processes

KEYWORDS: Mine Water, Water Protection, Circular Water Treatment, Management Strategies

CORE PROJECT PARTNERS: Fraunhofer-IKTS, Germany; MINTEK, (RSA); Wismut GmbH, Germany

CONTACTS FOR FURTHER INFORMATION:

hans-juergen.friedrich@ikts.fraunhofer.de

kerrid@mintek.co.za

MAMDIWAS – Membrane-Based Decentralized Reclamation of Acid Mine Drainage (AMD) for Improvement of Water Security and Mitigation of Environmental Impacts in Southern Africa

PROJECT SUMMARY

The focus of the project is set on three main pillars: 1. developing a membrane-based water treatment approach enabling AMD reuse and recovery of recyclables; 2. applying IWRM to assess water availability/quality at river basin level and enable AMD re-use; 3. applying governance approaches to enable broad application of technology and strategies. Main activities: round table discussions with stakeholders, site visits for selection of case study sites and realization of one workshop. Key findings: concepts for AMD treatment and IWRM exist but are neither cost-effective nor linked, lack of trust, peer-to-peer learning collaborations and fruitful communication channels among stakeholders, and of financing instruments.



KEYWORDS: AMD, Water Reuse, Recovery of Recyclables, IWRM, Governance

CORE PROJECT PARTNERS: Universität Duisburg-Essen/Zentrum für Wasser- & Umweltforschung, IWW Rheinisch-Westfälisches Institut für Wasserforschung, University of South Africa, Stellenbosch University, UN-Habitat

CONTACTS FOR FURTHER INFORMATION:

Prof. Dr.-Ing. Stefan Panglisch

Universität Duisburg-Essen, Wassertechnologie & Zentrum für Wasser- und Umweltforschung
Lotharstraße 1, 47057 Duisburg

Email: stefan.panglisch@uni-due.de, Tel.: +49 (0)203/379-3477

The following ministries as well as their relevant subordinate organizations were involved as part of the German governments round table in the development of the WASA program:

Ministry of Education and Research (BMBF), the Federal Foreign Office (AA), the Federal Ministry for Economic Cooperation and Development (BMZ), the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV), the Federal Ministry of Food and Agriculture (BMEL), the Federal Ministry for Digital and Transport (BMDV), the Federal Ministry for Economic Affairs and Climate Action (BMWK)

The responsibility for the content of this publication lies with the authors of the individual contributions.

Published by

Project Management Agency Karlsruhe (PTKA)

October 2022

Edited by

Project Management Agency Karlsruhe (PTKA)

Photo Credit

iStock/Nikada

Additional Information and contacts

<https://www.fona.de/en/measures/funding-measures/water-security-in-africa-wasa.php>

SPONSORED BY THE



Federal Ministry
of Education
and Research